Amendments to the Claims

1. (currently amended) A system for encoding a plurality of videos acquired of a moving object in a scene by a plurality of fixed cameras, comprising:

means for determining camera calibration data of each camera of a plurality of cameras;

means for concurrently acquiring a plurality of videos of the 3D moving object in a scene with the plurality of cameras, in which there is one video acquired by each camera;

means for associating the camera calibration data of each camera with the video acquired by the camera;

means for determining a segmentation mask for each frame of each video, the segmentation mask identifying only pixels in the frame associated with the moving object;

a shape encoder configured to encode the segmentation masks;

a position encoder configured to encode a 3D position of each pixel; ~~and~~

a color encoder configured to encode a color of each pixel; and

means for combining the encoded segmentations masks, pixel positions and colors of the pixels to form a 3D bitstream representing the moving object.

2. (currently amended) The system of claim 1, further comprising:

a multiplexer configured to combine outputs of the shape encoder, the position encoder, and the color encoder into a single 3D bitstream.

3. (original) The system of claim 2, further comprising:

a decoder;

means for transferring the bitstream to the decoder; and

rendering a decoded bitstream from an arbitrary viewpoint using the camera calibration data.

4. (original) The system of claim 3, in which the arbitrary viewpoint is constrained in space.

5. (original) The system of claim 3, in which the arbitrary viewpoint is unconstrained in space.

6. (original) The system of claim 1, further comprising:

means for maintaining a dynamic 3D point model defining a geometry of the moving object.

7. (original) The system of claim 1, in which each point of the dynamic 3D point model is associated with an identifier of one or more of the plurality of cameras.

8. (original) The system of claim 1, in which the encoded segmentation masks are compressed using a lossless compression, and the position and the colors are encoded using a lossy compression.

AW
8/29/07

9. (original) The ~~method~~ system of claim 1, in which the camera calibration data are updated periodically when any of the fixed cameras are relocated.

10. (original) The system of claim 1, in which the segmentation masks are encoded using MPEG-4 lossless binary shape encoding, the positions include depth values encoded as quantized pixel luminance values, and the colors are encoded using MPEG-4 video object coding.

AW 8/29/07

11. (original) The ~~method~~ system of claim 1, in which the entire scene is encoded using a scene specifying relations between static and dynamic portions of the scene.

12. (original) The system of claim 1, further comprising:

a decoder configured to decode the encoded segmentation masks, the encoded positions, and the encoded colors as an output video having an arbitrary viewpoint using the camera calibration data.

13. (original) The system of claim 12, in which the arbitrary viewpoint is different than a viewpoint of any of the cameras.

14. (original) The system of claim 12, in which images of the output video are composited with a virtual scene.

15. (original) The system of claim 12, in which a playback frame rate of the output video is different than a frame rate used to acquired the videos by the plurality of cameras.

16. (original) The system of claim 8, in which the lossy compression scheme is a progressive encoding using embedded zerotree wavelet coding.

17. (currently amended) The system of claim 1, in which the shape encoder ~~use~~ uses MPEG-4 lossless binary shape encoding, the position encoder encodes depth values, and the color encoder uses MPEG-4 video object coding.

18. (original) The system of claim 1, further comprising:

means for partitioning each video into a plurality of segments, each segment including a plurality of frames; and

means for encoding a key frame and difference frames of each segment, using the shape encoder, the position encoder, and the color encoder into a single bitstream.

19. (original) The system of claim 18, in which the key frames comprise a base layer of an encoded video bitstream, and the difference frames comprise an enhancement layer of the encoded bitstream.

20. (original) The system of claim 18, further comprising:

means for averaging the frames in each segment to construct the key frame;

means for determining the difference frame for each frame in the segment from the key frame and the frame.

21. (original) The system of claim 18, in which the key frame is a first frame of the segment, and a difference frame is determined from a current frame and previous frames in the segment.

22. (original) The system of claim 1, further comprising:

a surface normal encoder configured to encode a surface normal of each pixel; and

a splat size encoder configured to encode a splat size for each pixel; and

means for combining the outputs of the surface normal encoder and the splat size encoder with the single bitstream.

23. (original) The system of claim 22, in which the surface normal vectors are progressively encoded using an octahedron subdivision of a unit sphere and the splat sizes are encoded as quantized codewords represented in a gray scale MPEG video object.

24. (original) The system of claim 12, in which splat sizes and surface normals are estimated from the positions.